REMARKS

This is in full and timely response to the Office Action mailed on August 28, 2007.

Claims 1, 3, and 5-26 are currently pending in this application, with claims 1, 3, 7 and 21 being independent. *No new matter has been added.*

Reexamination in light of the following remarks is respectfully requested.

Rejection under 35 U.S.C. §103

Paragraph 5 of the Office Action indicates a rejection of claims 1-8 under 35 U.S.C. §103 as allegedly being unpatentable over U.S. Patent No. 6,510,254 to Nakami et al. (Nakami) and U.S. Patent No. 6,707,467 to Suga.

This rejection is traversed at least for the following reasons.

Claims 1 and 5 - At least for the following reasons, if the allowance of claim 1 is not forthcoming at the very least and a new ground of rejection made, then a ***new non-final Office Action*** is respectfully requested.

Claim 5 is dependent upon claim 1. Claim 1 is drawn to an image processing method for a digital image, characterized in that

> interpolation signals between discrete original pixels used for calculating an output pixel value are calculated by an FIR digital filter using as an interpolation function a function obtained by composing a function based on a cubic convolution method and a function based on a bilinear method,

wherein said FIR filter uses as an interpolation function a function that is obtained by composing a part of the function based on the cubic convolution method and a part of the function based on the bilinear method and is asymmetric with respect to the right and left.

Claims 3 and 6 - At least for the following reasons, if the allowance of claim 3 is not forthcoming at the very least and a new ground of rejection made, then a ***new non-final Office Action*** is respectfully requested.

Claim 6 is dependent upon claim 3. Claim 3 is drawn to an image processing device for a digital image, characterized by comprising an FIR digital filter using as an interpolation function a function obtained by composing a function based on a cubic convolution method and a function based on a bilinear method for an interpolation signal between discrete original pixels used for calculating an output pixel value,

wherein said FIR filter uses as an interpolation function a function that is obtained by composing a part of the function based on the cubic convolution method and a part of the function based on the bilinear method and is asymmetric with respect to the right and left.

Claim 7 and 8 - Claim 8 is dependent upon claim 7. Claim 7 is drawn to an electronics apparatus for a digital image, characterized by comprising

an FIR digital filter using as a function a right-and-left asymmetrical interpolating function obtained by composing a function based on a part of a cubic convolution method and a part of a bilinear method for an interpolation signal between discrete original pixels used for calculating an output pixel value.

Paragraph [0053] of U.S. Patent Application Publication No. 2002/0146180, the publication document for the above-identified application, provides that:

> A second bilinear method is to calculate an interpolated pixel value by subjecting two neighboring pixels thereof to linear interpolation. The interpolating function thereof is called as a triangle function, and it is represented by a graph as shown in FIG. 6. The interpolating function h(x) in the bilinear method is shown in the following equation 3.

Figures 6 and 7 of the present application are provided hereinbelow.

FIG. 6

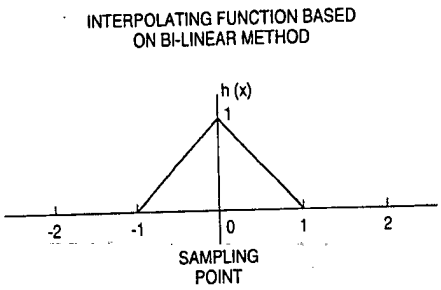
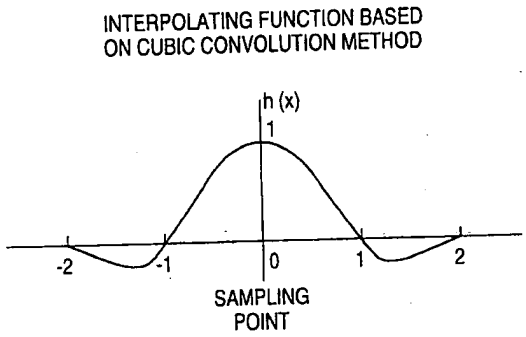


FIG. 7



Amended paragraph [0054] of U.S. Patent Application Publication No. 2002/0146180, the publication document for the above-identified application, provides that:

> A third cubic convolution method is a method of calculating an interpolated pixel value by convoluting a finite-range (-2<x<+2) approximate equation of the sinc function as an interpolating function into four pixel values that are neighboring to the interpolated pixel value. The interpolating function in this method is represented by a graph as shown in FIG. 7. The interpolating function h(x) in the cubic convolution method is shown in the following equation 4.

Figures 8 and 9 of the present application are provided hereinbelow.

FIG. 8

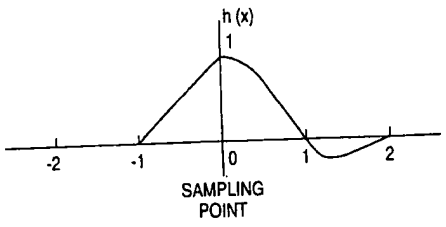
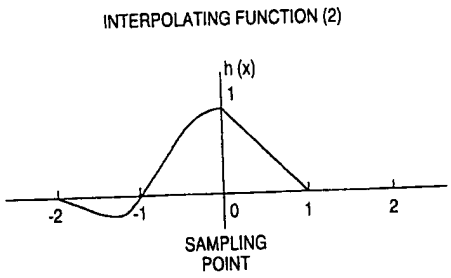


FIG. 9



Paragraph [0061] of U.S. Patent Application Publication No. 2002/0146180, the publication document for the above-identified application, provides that:

> Graphing the interpolating functions in the image processing method of the present invention indicated by (1) and (2) of the equation 5, the graphs shown in FIGS. 8 and 9 are achieved for the interpolating functions, respectively. In the equation of the former (1), the interpolating function based on the bilinear method is used for the area of $x<0$ and the interpolating function based on the cubic convolution method is used for the area of $x\geq 0$ while the boundary between the areas is set to $x=0$. Conversely, in the equation of the latter (2), the interpolating function based on the cubic convolution method is used for the area of $x\leq 0$, and the interpolating function based on the bilinear method is used for the area of $x>0$.

Nakami - Nakami arguably teaches the presence of a *hybrid bicubic function* (Nakami at column 11, lines 23-32).

- ***However, Nakami fails to disclose, teach, or suggest the hybrid bicubic function as being a function that is obtained by composing a part of the function based on the cubic convolution method and a part of the function based on the bilinear method.***

Instead, Nakami arguably teaches that since the influence degree f(t) is ***expressed as the cubic function*** in the cubic method, the quality of result of interpolation can be varied by adjusting the shape of a curve thereof (Nakami at column 11, lines 20-23).

Page 2 of the Office Action refers to Figure 19. Figure 19 of Nakami is provided hereinbelow.

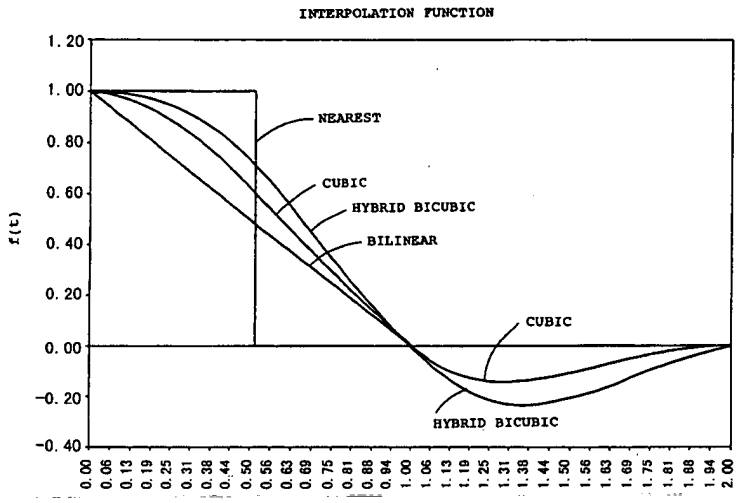


FIG. 19

Nakami arguably teaches that the axis of abscissas denotes a location and the axis of ordinates denotes an interpolation function corresponding to the above-described influence degree according to the distance between the interpolation point and each lattice point (Nakami at column 12, lines 2-6).

However, a review of Figure 19 reveals an ***absence*** of the interpolation function being *asymmetric with respect to the right and left of the axis of abscissas* since the interpolation function left of the axis of abscissas is ***omitted*** from Figure 19.

- ***As consequence, Nakami fails to disclose, teach, or suggest the hybrid bicubic function as being a function that is asymmetric with respect to the right and left.***

- ***In addition, the Office Action admits that Nakami fails to teach a FIR filter using an interpolation function (Office Action at page 3).***

Suga - Suga arguably teaches that, as the second resolution transforming processing method, there is adopted a method of obtaining interpolation position data by using the FIR filter employed to *the linear interpolation method and the cubic convoluting interpolation method* (Suga at column 8, lines 40-45).

But as shown in equation (10) of Suga (column 9, lines 31-58), Suga fails to disclose, teach, or suggest the FIR filter being ***asymmetric*** *with respect to the right and left.*

Additionally shown by equation (10) of Suga (column 9, lines 31-58), Suga fails to disclose, teach, or suggest the FIR digital filter using as a function a *right-and-left* ***asymmetrical*** *interpolating function*.

- ***Thus, Nakami and Suga, either individually or as a whole, fail to disclose, teach, or suggest that said FIR filter uses as an interpolation function a function that is obtained by composing a part of the function based on the cubic convolution method and a part of the function based on the bilinear method and is asymmetric with respect to the right and left, as in claim 1.***

- ***Moreover, Nakami and Suga, either individually or as a whole, fail to disclose, teach, or suggest that said FIR filter uses as an interpolation function a function that is obtained by composing a part of the function based on the cubic convolution method and a part of the function based on the bilinear method and is asymmetric with respect to the right and left, as in claim 3.***

- ***In addition, Nakami and Suga, either individually or as a whole, fail to disclose, teach, or suggest an FIR digital filter using as a function a right-and-left asymmetrical interpolating function obtained by composing a function based on a part of a cubic convolution method and a part of a bilinear method for an interpolation signal***

between discrete original pixels used for calculating an output pixel value, as in claim 7.

Withdrawal of this rejection and allowance of the claims is respectfully requested.

Newly added claims

Claims 9-20 - Newly added claims 9-20 are allowable at least for the reasons provided hereinabove and for the additional features that they recite.

Claims 21-26 - Claims 22-26 are dependent upon claim 21. Claim 21 is drawn to an image processing method for a digital image, the method comprising:

sampling discrete original pixels of an image;

calculating a value of an interpolation pixel in an area of said image between one of the discrete original pixels and another of the discrete original pixels,

wherein the calculating step includes applying a processing method to said one of the discrete original pixels, and applying another method different than said processing method to said another of the discrete original pixels.

Paragraph [0061] of U.S. Patent Application Publication No. 2002/0146180, the publication document for the above-identified application, provides that:

Graphing the interpolating functions in the image processing method of the present invention indicated by (1) and (2) of the equation 5, the graphs shown in FIGS. 8 and 9 are achieved for the interpolating functions, respectively. In the equation of the

former (1), the interpolating function based on the bilinear method is used for the area of $x<0$ and the interpolating function based on the cubic convolution method is used for the area of $x\geq 0$ while the boundary between the areas is set to $x=0$. Conversely, in the equation of the latter (2), the interpolating function based on the cubic convolution method is used for the area of $x\leq 0$, and the interpolating function based on the bilinear method is used for the area of $x>0$.

Figures 8 and 9 of the present application are provided hereinbelow.

FIG. 8

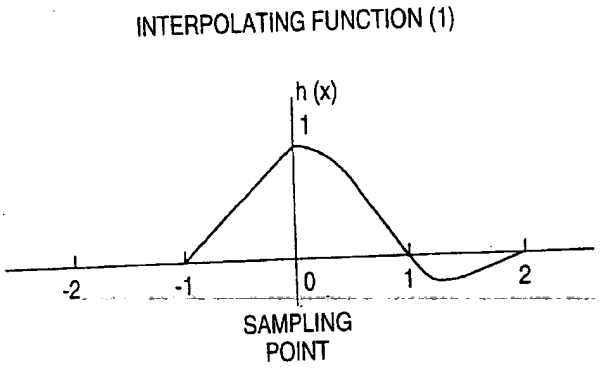
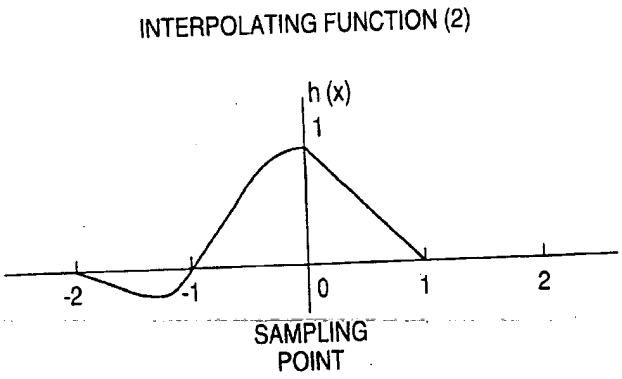


FIG. 9



Paragraph [0063] of U.S. Patent Application Publication No. 2002/0146180, the publication document for the above-identified application, provides that:

[0063] FIGS. 14 and 15 show an interpolation signal calculating method based on the convolution in the interpolating methods of the interpolating functions (1) and (2) shown in the equation 5. In the above interpolating methods, pixels of three adjacent points (Z^0, Z^{-1}, Z^{-2}) are needed for calculating the interpolation signal, and thus the interpolation signal is equal to A+B+C in FIGS. 14 and 15.

Figures 14 and 15 of the present application are provided hereinbelow.

FIG. 14

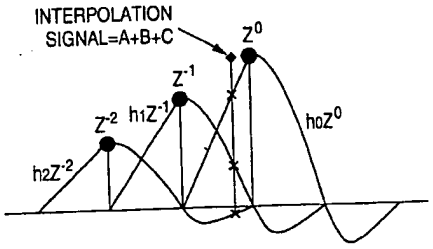
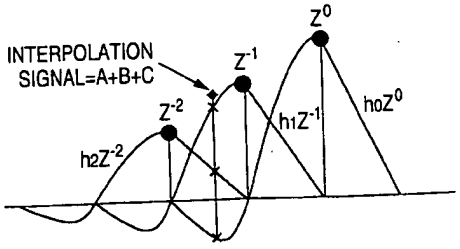


FIG. 15



Nakami - Nakami arguably teaches the presence of a *hybrid bicubic function* (Nakami at column 11, lines 23-32).

Page 2 of the Office Action refers to Figure 19. Figure 19 of Nakami is provided hereinbelow.

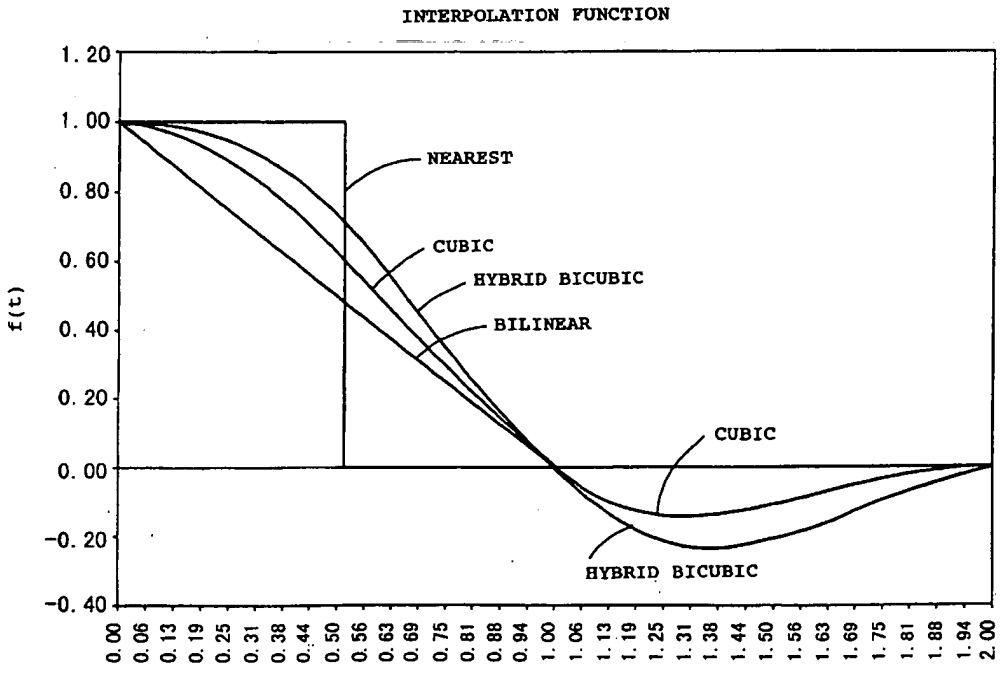


FIG. 19

Nakami arguably teaches that the axis of abscissas denotes a location and the axis of ordinates denotes an interpolation function corresponding to the above-described influence degree according to the distance between the interpolation point and each lattice point (Nakami at column 12, lines 2-6).

However, a review of Figure 19 reveals an ***absence*** of the interpolation function being *asymmetric with respect to the right and left of the axis of abscissas* since the interpolation function left of the axis of abscissas is ***omitted*** from Figure 19.

In this regard, Nakami fails to disclose, teach, or suggest the hybrid bicubic function as being a function that includes the application of a processing method to one of the discrete original pixels, and the application of another method different than the processing method to another of the discrete original pixels.

- ***Thus, Nakami fails to disclose, teach, or suggest a method that includes a step of calculating a value of an interpolation pixel in an area of said image between one of the discrete original pixels and another of the discrete original pixels, wherein the step of calculating includes applying a processing method to said one of the discrete original pixels, and applying another method different than said processing method to said another of the discrete original pixels.***

Suga - Suga arguably teaches that, as the second resolution transforming processing method, there is adopted a method of obtaining interpolation position data by using the FIR filter employed to *the linear interpolation method and the cubic convoluting interpolation method* (Suga at column 8, lines 40-45).

But as shown in equation (10) of Suga (column 9, lines 31-58), Suga fails to disclose, teach, or suggest the FIR filter being ***asymmetric*** *with respect to the right and left.*

Additionally shown by equation (10) of Suga (column 9, lines 31-58), Suga fails to disclose, teach, or suggest the FIR digital filter using as a function a *right-and-left asymmetrical interpolating function*.

- ***Thus, Suga fails to disclose, teach, or suggest a method that includes a step of calculating a value of an interpolation pixel in an area of said image between one of the discrete original pixels and another of the discrete original pixels, wherein the step of calculating includes applying a processing method to said one of the discrete original pixels, and applying another method different than said processing method to said another of the discrete original pixels.***

Withdrawal of this rejection and allowance of the claims is respectfully requested.

Conclusion

For the foregoing reasons, all the claims now pending in the present application are allowable, and the present application is in condition for allowance.

Therefore, this response is believed to be a complete response to the Office Action.

Applicants reserve the right to set forth further arguments supporting the patentability of their claims, including the separate patentability of the dependent claims not explicitly addressed herein, in future papers.

There is no concession as to the veracity of Official Notice, if taken in any Office Action. An affidavit or document should be provided in support of any Official Notice taken. 37 CFR 1.104(d)(2), MPEP § 2144.03. See also, *Ex parte Natale*, 11 USPQ2d 1222, 1227-1228 (Bd. Pat. App. & Int. 1989)(failure to provide any objective evidence to support the challenged use of Official Notice constitutes clear and reversible error).

Accordingly, favorable reexamination and reconsideration of the application in light of the remarks is courteously solicited.

Extensions of time

Please treat any concurrent or future reply, requiring a petition for an extension of time under 37 C.F.R. §1.136, as incorporating a petition for extension of time for the appropriate length of time.

Fees

The Commissioner is hereby authorized to charge all required fees, fees under 37 C.F.R. §1.17, or all required extension of time fees. If any fee is required or any overpayment made, the Commissioner is hereby authorized to charge the fee or credit the overpayment to Deposit Account # 18-0013.

If the Examiner has any comments or suggestions that could place this application in even better form, the Examiner is requested to telephone Brian K. Dutton, Reg. No. 47,255, at 202-955-8753.

Dated: January 23, 2008

Respectfully submitted,

By 40,290

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